Report of Findings

Prairie Dog Vegetation
Monitoring Transects – 2008
Davidson Mesa
City of Louisville Open Space
Louisville, CO

Prepared for:

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INTRODUCTION

Studies reported here were undertaken August 2008 with the intent of documenting effects of prairie dog occupation on plant communities on the City of Louisville Davidson Mesa Open Space property. Prairie dogs had been translocated from elsewhere in Louisville when the study began in 2001. This study continued data collection from permanently marked sample sites that were to be periodically revisited to examine trends in vegetation cover related to the newly established presence of prairie dogs as compared to adjacent unoccupied areas within the same plant community. The areas occupied by prairie dogs had been mowed in 2001 (ESCO 2001) prior to arrival of the animals and prior to the establishment of the monitoring transects. The control (unoccupied) transects were placed in areas not mowed.

As of the 2003 monitoring (ESCO 2003), no prairie dogs were present on the site. Holes (burrows) showed no sign of recent use, and the vegetation had recovered height considerably beyond what prairie dogs seem normally to find acceptable. Despite their absence, reference to the sample sites in the text below will be to "occupied" and "unoccupied" areas for purposes of distinguishing the two areas.

METHODS

Sample Location

Three samples were sampled in established prairie dog colonies while two samples were located outside of the colonies. The three samples that were located within the translocation area were numbered 1, 2 and 3. Transects 4 and 5 were those located outside the translocation areas (i.e. these were "control" samples). At each sample location, the end points of the sample transect were marked with a rebar stake driven flush with the ground and covered with a bright yellow plastic cap marked "VEGETATION STUDY TRANSECT".

Cover

Cover data were collected using a point intercept method in which data were recorded as interceptions of a point with plant species, litter, standing dead plant material, soil or

rock. Plant material produced during 2008 and still standing was tallied by species. Litter was considered to be any organic material that had fallen, or begun to fall to the soil surface. Standing dead was any dead plant material that was produced in previous years but which was still standing and had not lodged or broken off to become litter. Inorganic materials greater than 1 cm in diameter were considered rock. The cover sampling points were optically projected using a Cover-Point Optical Point Projection Device. One hundred points were collected at each transect and distributed evenly along the transect with a pair of points collected at each meter mark. The pair of points were sampled on opposite sides of the transect, 0.5 m from the transect.

The point intercept method of cover assessment was chosen because it provides superior objectivity and repeatability. This method collects more information about abundant species than about rare species. This tendency has been countered through use of a total vascular species inventory along the sample transect (see "Species Diversity").

Species Diversity (Density)

A full accounting of all plant species encountered within each of the areas sampled for cover was compiled. Along point intercept transects, species presence was noted within the area one meter to either side of the transect (50m x 2m = 100 m^2). These presence data along with point-intercept data themselves were used to produce values for species density expressed on a per 100 sq. m. basis.

Sampling Date

Sampling of the transects reported here was conducted on August 13, 2008.

Photographic Documentation

A photograph oriented along each transect from the origin was taken at each site. These photographs are attached to this report.

Plant Nomenclature

Plant species nomenclature follows Weber and Wittmann (1996).

RESULTS

As of 2003, the areas into which prairie dogs had been translocated (Transects 1, 2, and 3) were unoccupied. As of 2008, Transects 1 and 2 were still unoccupied but Transect 3 is now (again occupied). Data from Transects 1 and 2 are reported and summarized in Table 1. Data from Transect 3 is presented in Table 2. Transect 4 continues to be unoccupied and the data from that sample are presented in Table 3. Transect 5, shown in Table 4, was originally a control area sample but it now has been engulfed by the enlarging prairie dog town that extends from City of Boulder Open Space to the west eastward on to Louisville Open Space. Absolute vegetation cover data by lifeform are graphically presented in Figure 1. Figure 2 presents Relative Vegetation Cover separated by lifeform for 2008 data. Figure 3 provides graphical representation of species density (number of species per 100-sq. m.) for 2008 data.

DISCUSSION

General

It is to be remembered that the vegetation of the study area (prior to the translocation of prairie dogs) is the product of a reseeding effort undertaken after the area was covered with spoil from the excavation of Harper Lake a short distance to the east. Intermediate wheatgrass (*Thinopyrum intermedium*) by far the most abundant plant present prior to the introduction of prairie dogs, apparently was by far the most successful component of the seeding (and conceivably was the only component of the seed mix).

Another important variable affecting the plant cover at the time of observation in late August 2008 was the rainy period in early August that followed an extremely dry June and July. The early August rains germinated abundant winter annual seedlings, especially Japanese brome (*Bromus japonicus*).

Total Vegetation Cover

Total vegetation cover (Figure 1) as of the 2008 observations increased considerably during the few weeks just prior to the sampling by germination of Japanese brome in response to the August rains. If the red portion of the bars in Figure 1 is mentally removed (introduced annual grass, mostly Japanese brome), it can be seen that the cover of perennials was very limited. In the transects that were only briefly occupied in

2001 as well as the control that has remained intact (Transect 4), perennial cover in the form of intermediate wheatgrass is very similar. The two briefly occupied transects (1 and 2) have, in addition, a substantial presence of native perennial cool season grass as they did in 2001.

Transects that actually have prairie dogs present in 2008 (3 and 5) have the least perennial cover (Figure 1) and by far the largest response of Japanese brome.

Relative Cover by Lifeform

Relative cover (Figure 2) shows some of the same trends mentioned above, and emphasizes the influence of prairie dog presence on the abundance of annual and biennial plants. Transects 1 and 2 both had a spike of annual/biennial abundance in the year 2001 at the time of prairie dog introduction. Following their disappearance, the abundance of annual/biennial plants has declined.

Species Density by Lifeform

In terms of the number of species per 100 sq.m. (species density), the occupied transect (3) has greater total species density than the unoccupied ones (1 and 2) because there are more annual and biennial weedy species where the prairie dogs are present. The two occupied transects (3 and 5) have 4 and 2 perennial species present, respectively. Note however that the control site (4) has only three perennial species present. Thus, the effect of prairie dogs on density of perennial species seems small.

As can be seen in Figure 3, the unoccupied sites had experienced a substantial reduction in species density after 2001. The very dry conditions of 2002 may have been responsible for this reduction.

Summary

Prairie dog presence has resulted in lowered cover by the main perennial species, intermediate wheatgrass. Total cover however in the areas occupied by the prairie dogs as of late 2008 was actually greater than unoccupied areas because of the abundant germination of Japanese brome, an introduced winter annual species (weed).

References Cited

ESCO Associates. 2001. Report of Findings, Prairie Dog Vegetation Monitoring Transects – 2001, Davidson Mesa, City of Louisville Open Space, Louisville, CO. Prepared for City of Louisville Open Space Department, 749 Main St., Louisville, CO 80027.

ESCO Associates. 2003. Report of Findings, Prairie Dog Vegetation Monitoring Transects – 2003, Davidson Mesa, City of Louisville Open Space, Louisville, CO. Prepared for City of Louisville Open Space Department, 749 Main St., Louisville, CO 80027.

Weber, W.A. and R.C. Wittmann. 1996. Colorado Flora: Western Slope. Colorado Associated Univ. Press, Boulder.

Figure 1. Absolute (All hit) Vegetation Cover by Lifeform - Prairie Dog Study, City of Louisville Open Space, CO - 2001, 2003 and 2008

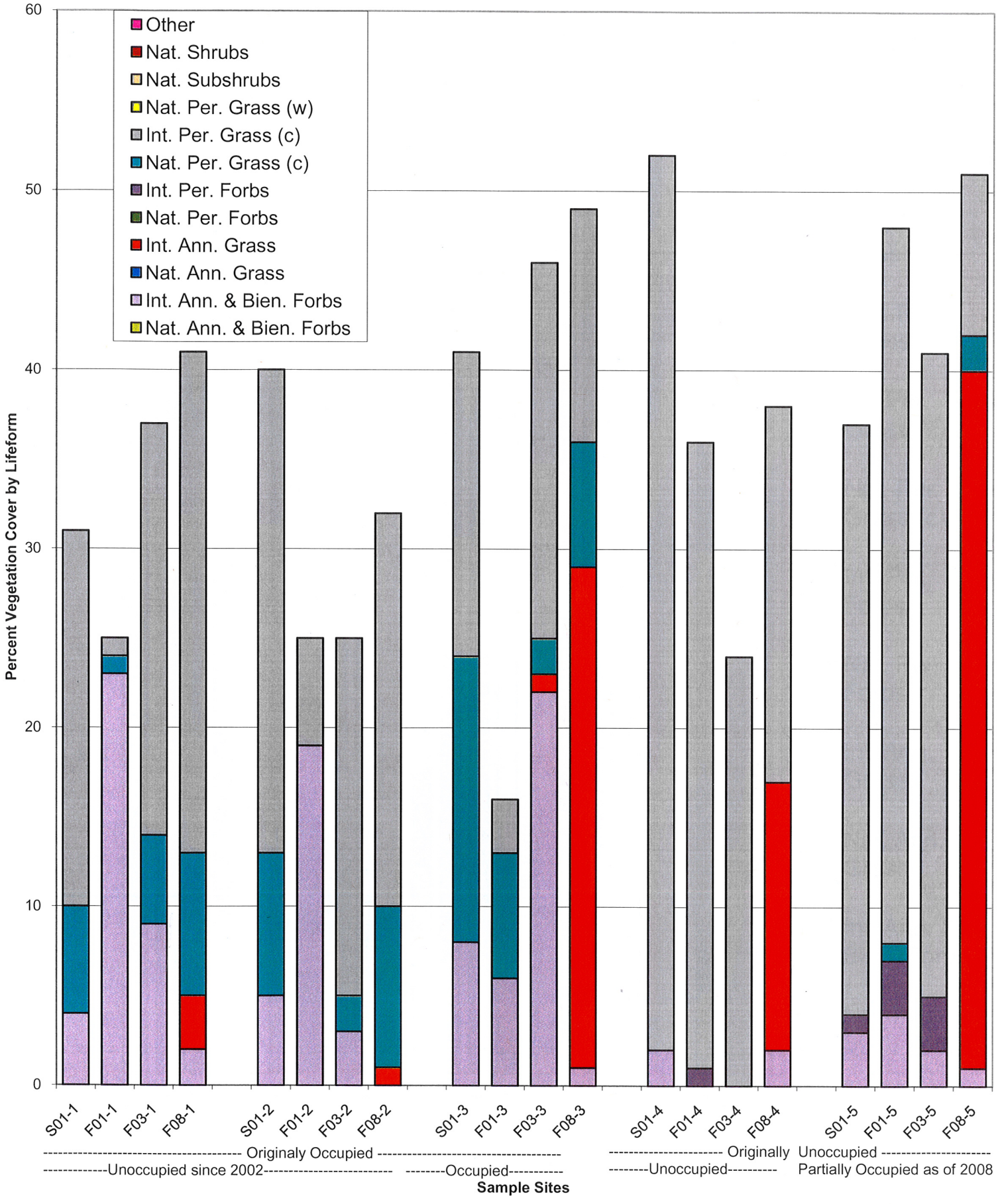


Figure 2. Relative (All hit) Cover by Lifeform - Prairie Dog Study, City of Louisville Open Space, CO - 2001, 2003 and 2008

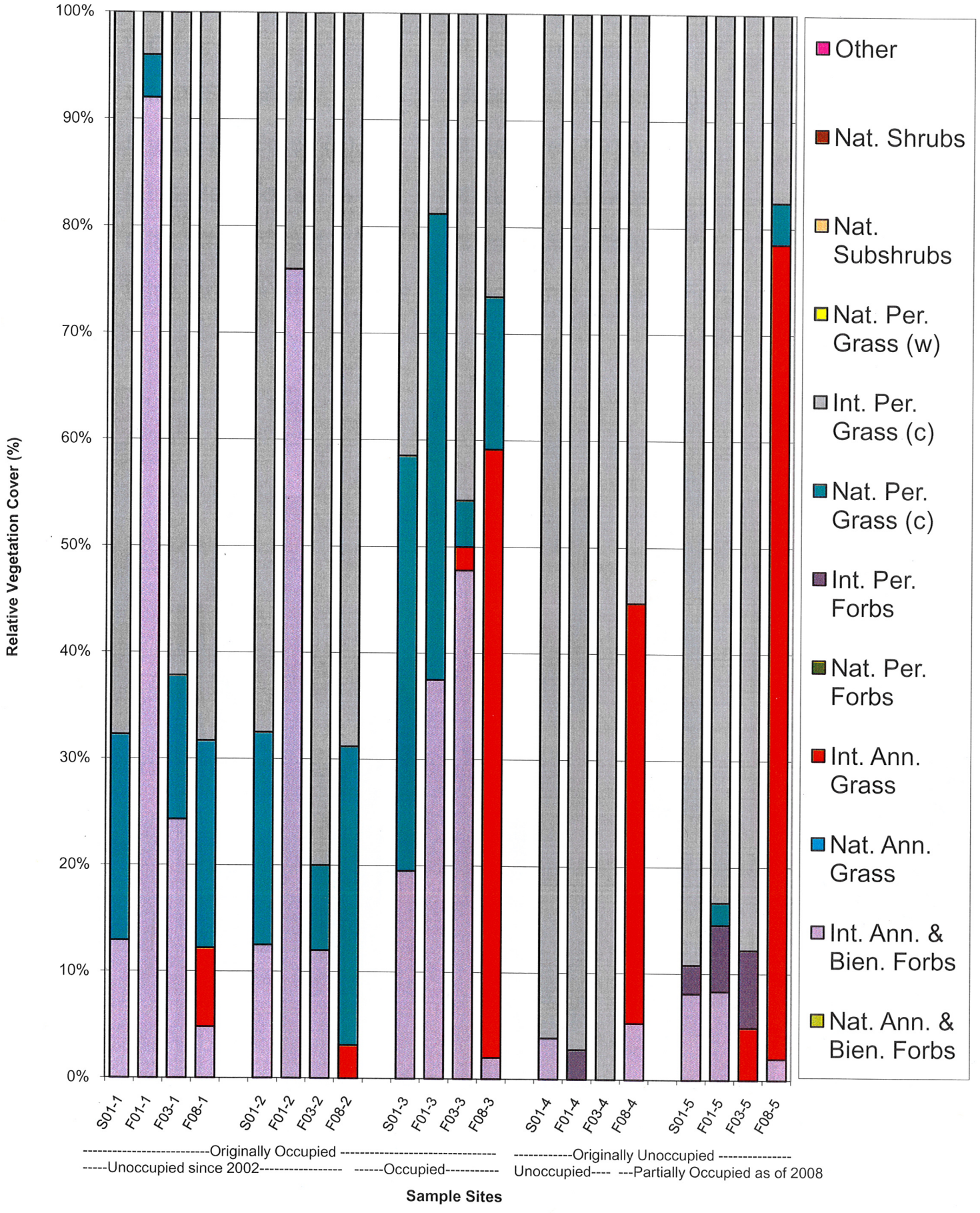


Figure 3. Species Density by Lifeform - Prairie Dog Study, City of Louisville Open Space, CO - 2001, 2003 and 2008

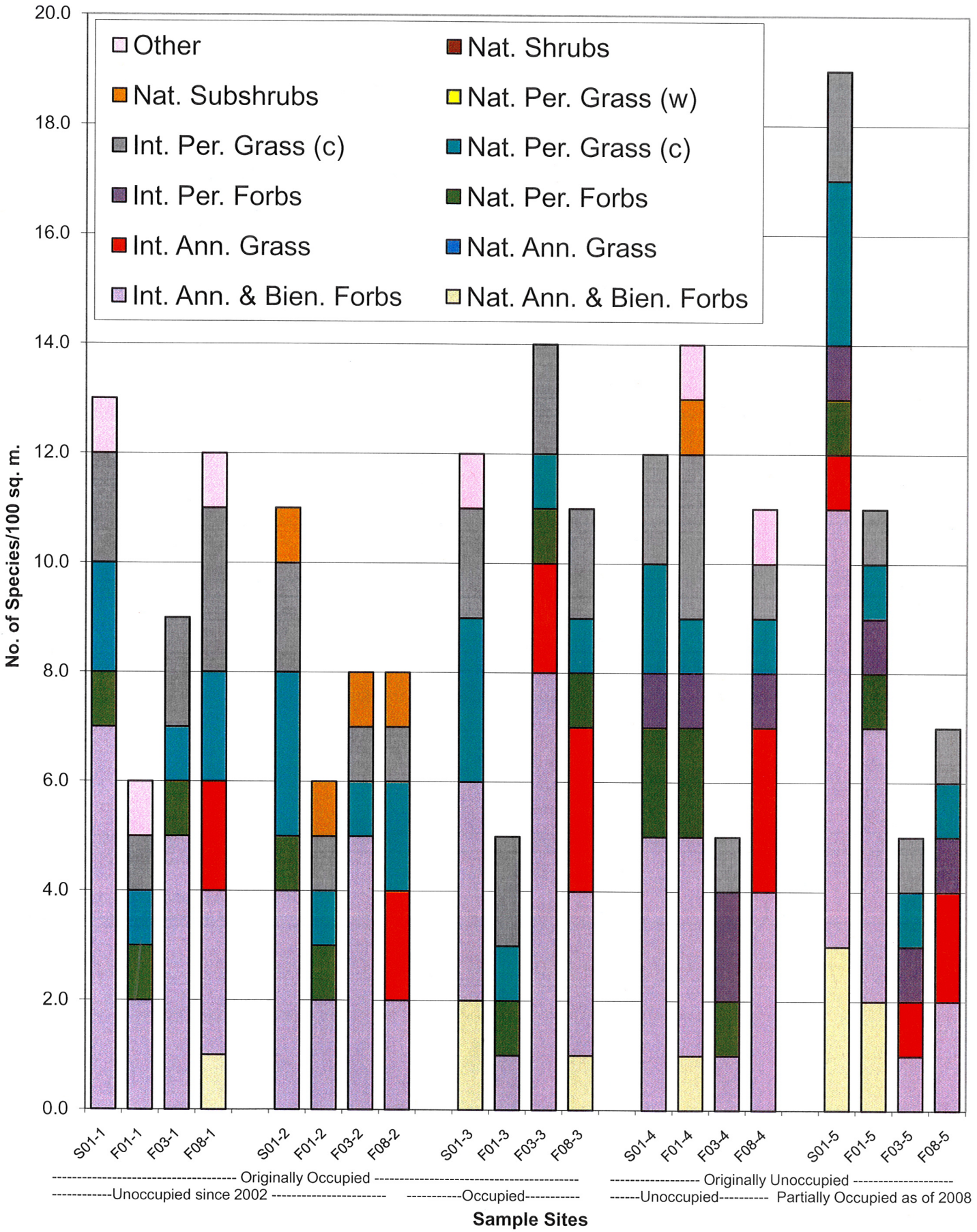


Table 1. Cover Data - City of Louisville Prairie Dog Unoccupied transects -2008

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- 1	2
NATIVE ANNUAL & BIENNIAL FORBS							
Descurainia incana	0.00	50.00	0.00	0.00	0.00	P	
TOTAL NATIVE ANN. & BIEN. FORBS	0.0	50.0	0.0	0.0	0.0	P	---
INTRODUCED ANNUAL & BIENNIAL FORBS							
Alyssum parviflorum	0.00	50.00	0.00	0.00	0.00	P	
Lactuca serriola	0.00	100.00	0.00	0.00	0.00	P	P
Sisymbrium altissimum	1.00	100.00	2.78	1.00	2.74	2	P
TOTAL INTRO. ANN. & BIEN. FORBS	1.0	100.0	2.8	1.0	2.7	2	P
INTRODUCED ANNUAL GRASSES							
Anisantha tectorum	0.50	100.00	1.39	0.50	1.37	1	P
Bromus japonicus	1.50	100.00	4.17	1.50	4.11	2	1
TOTAL INTRO. ANN. GRASSES	2.0	100.0	5.6	2.0	5.5	3	1
NATIVE PERENNIAL GRASSES (cool)							
Panicum capillare	0.50	50.00	1.39	0.50	1.37		1
Poa agassizensis	8.00	100.00	22.22	8.00	21.92	8	8
Poa compressa	0.00	50.00	0.00	0.00	0.00	P	
TOTAL NATIVE PERENNIAL GRASSES (c)	8.5	100.0	23.6	8.5	23.3	8	9
INTRODUCED PERENNIAL GRASSES (cool)							
Agropyron desertorum	0.50	50.00	1.39	0.50	1.37	1	
Bromopsis inermis	0.00	50.00	0.00	0.00	0.00	P	
Thinopyrum intermedium	24.00	100.00	66.67	24.50	67.12	27	21(1)
TOTAL INTRO. PERENNIAL GRASSES (c)	24.5	100.0	68.1	25.0	68.5	28	21(1)
NATIVE SUBSHRUBS							
Gutierrezia sarothrae	0.00	50.00	0.00	0.00	0.00		P
TOTAL NATIVE SUBSHRUBS	0.0	50.0	0.0	0.0	0.0	---	P
SUCCULENTS							
Opuntia macrorhiza	0.00	50.00	0.00	0.00	0.00	P	
TOTAL SUCCULENTS	0.0	50.0	0.0	0.0	0.0	P	---
Standing dead	9.00	100.00		9.00		4	14
Litter	49.00	100.00		49.00		52	46
Bare soil	6.00	100.00		6.00		3	9
TOTALS	100.0			100.5		100	100
TOTAL VEGETATION COVER	36.0 (s=7.1)		100.0	36.5 (s=6.4)	100.0	41	31(1)
GROUND COVER (Litter+Rock+Veg+St.Dead)	94.0			94.5		97	91(1)
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 10.0 Std.Dev.= 2.8)						12	8

P=Present within 1 m. on either side of the cover transect but not quantitatively encountered.

PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- 3
NATIVE ANNUAL & BIENNIAL FORBS						
Descurainia incana	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE ANN. & BIEN. FORBS	0.0	100.0	0.0	0.0	0.0	P
INTRODUCED ANNUAL & BIENNIAL FORBS						
Alyssum parviflorum	0.00	100.00	0.00	0.00	0.00	P
Lactuca serriola	0.00	100.00	0.00	0.00	0.00	P
Sisymbrium altissimum	1.00	100.00	2.04	1.00	2.04	1
TOTAL INTRO. ANN. & BIEN. FORBS	1.0	100.0	2.0	1.0	2.0	1
INTRODUCED ANNUAL GRASSES						
Anisantha tectorum	4.00	100.00	8.16	4.00	8.16	4
Bromus japonicus	20.00	100.00	40.82	20.00	40.82	20
Panicum capillare	4.00	100.00	8.16	4.00	8.16	4
TOTAL INTRO. ANN. GRASSES	28.0	100.0	57.1	28.0	57.1	28
NATIVE PERENNIAL FORBS						
Brickellia eupatorioides	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL FORBS	0.0	100.0	0.0	0.0	0.0	P
NATIVE PERENNIAL GRASSES (cool)						
Poa agassizensis	7.00	100.00	14.29	7.00	14.29	7
TOTAL NATIVE PERENNIAL GRASSES (c)	7.0	100.0	14.3	7.0	14.3	7
INTRODUCED PERENNIAL GRASSES (cool)						
Bromopsis inermis	2.00	100.00	4.08	2.00	4.08	2
Thinopyrum intermedium	11.00	100.00	22.45	11.00	22.45	11
TOTAL INTRO. PERENNIAL GRASSES (c)	13.0	100.0	26.5	13.0	26.5	13
Standing dead	2.00	100.00		2.00		2
Litter	34.00	100.00		34.00		34
Bare soil	15.00	100.00		15.00		15
TOTALS	100.0			100.0		100
TOTAL VEGETATION COVER	49.0 (s=0.0)		100.0	49.0 (s=0.0)	100.0	49
GROUND COVER (Litter+Rock+Veg+St.Dead)	85.0			85.0		85
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 11.0 Std.Dev.= 0.0)						11

P=Present within 1 m. on either side of the cover transect but not quantitatively encountered.

Table 3. Cover Data - City of Louisville Prairie Dog Unoccupied transect - 2008

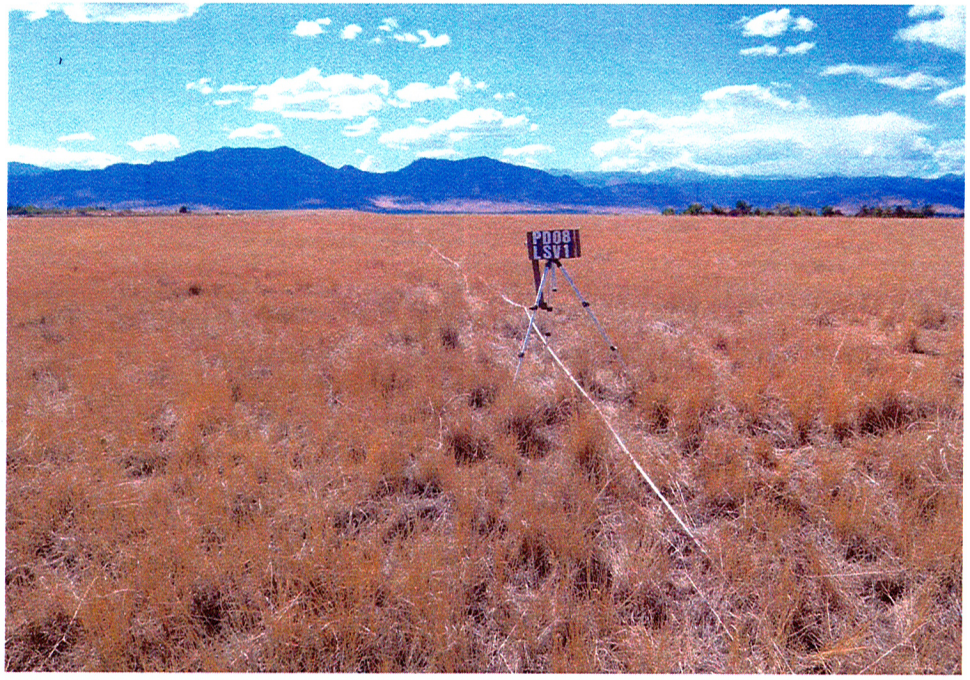
PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- 4
INTRODUCED ANNUAL & BIENNIAL FORBS						
Alyssum parviflorum	0.00	100.00	0.00	0.00	0.00	P
Lactuca serriola	1.00	100.00	2.63	1.00	2.63	1
Sisymbrium altissimum	1.00	100.00	2.63	1.00	2.63	1
Tragopogon dubius ssp. major	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. ANN. & BIEN. FORBS	2.0	100.0	5.3	2.0	5.3	2
INTRODUCED ANNUAL GRASSES						
Anisantha tectorum	0.00	100.00	0.00	0.00	0.00	P
Bromus japonicus	14.00	100.00	36.84	14.00	36.84	14
Panicum capillare	1.00	100.00	2.63	1.00	2.63	1
TOTAL INTRO. ANN. GRASSES	15.0	100.0	39.5	15.0	39.5	15
INTRODUCED PERENNIAL FORBS						
Convolvulus arvensis	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. PERENNIAL FORBS	0.0	100.0	0.0	0.0	0.0	P
NATIVE PERENNIAL GRASSES (cool)						
Poa agassizensis	0.00	100.00	0.00	0.00	0.00	P
TOTAL NATIVE PERENNIAL GRASSES (c)	0.0	100.0	0.0	0.0	0.0	P
INTRODUCED PERENNIAL GRASSES (cool)						
Thinopyrum intermedium	21.00	100.00	55.26	21.00	55.26	21
TOTAL INTRO. PERENNIAL GRASSES (c)	21.0	100.0	55.3	21.0	55.3	21
SUCCULENTS						
Opuntia macrorhiza	0.00	100.00	0.00	0.00	0.00	P
TOTAL SUCCULENTS	0.0	100.0	0.0	0.0	0.0	P
Standing dead	4.00	100.00		4.00		4
Litter	45.00	100.00		45.00		45
Bare soil	11.00	100.00		11.00		11
Rock	2.00	100.00		2.00		2
TOTALS	100.0			100.0		100
TOTAL VEGETATION COVER	38.0 (s=0.0)		100.0	38.0 (s=0.0)	100.0	38
GROUND COVER (Litter+Rock+Veg+St.Dead)	89.0			89.0		89
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 11.0 Std.Dev.= 0.0)						11

P=Present within 1 m. on either side of the cover transect but not quantitatively encountered.

Table 4. Cover Data -City of Louisville Prairie Dog Partially Occupied transect - 2008

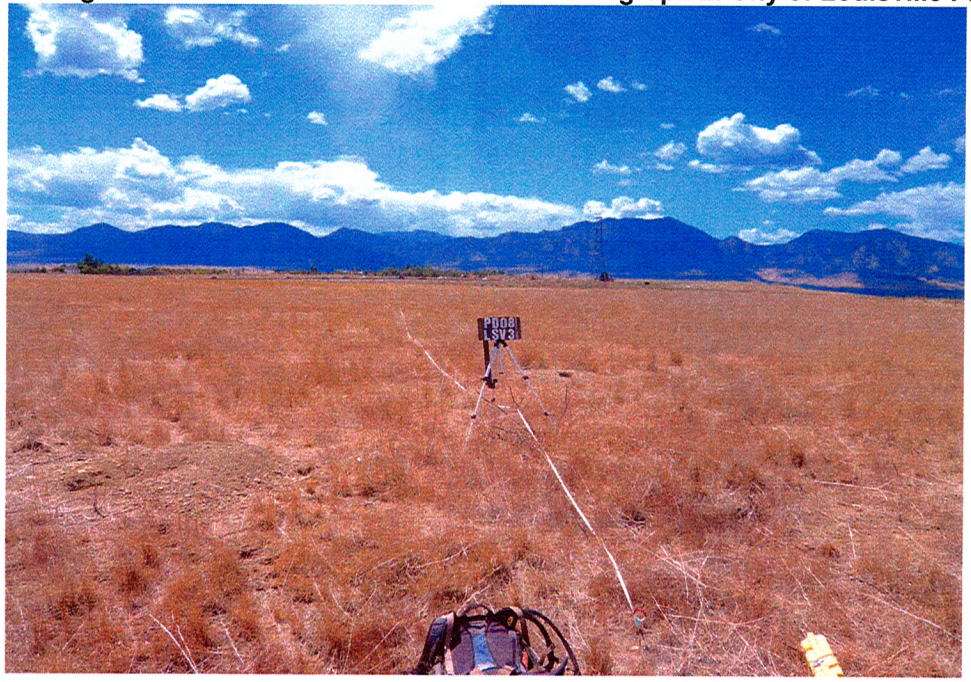
PLANT SPECIES	AVERAGE COVER (%)	FREQUENCY (%)	RELATIVE VEGETATION COVER (%)	AVERAGE COVER-ALL (%)	RELATIVE VEGETATION COVER-ALL (%)	Percent Foliar Cover* ----Sample Number---- 5
INTRODUCED ANNUAL & BIENNIAL FORBS						
Alyssum parviflorum	0.00	100.00	0.00	0.00	0.00	P
Sisymbrium altissimum	1.00	100.00	1.96	1.00	1.96	1
TOTAL INTRO. ANN. & BIEN. FORBS	1.0	100.0	2.0	1.0	2.0	1
INTRODUCED ANNUAL GRASSES						
Bromus japonicus	29.00	100.00	56.86	29.00	56.86	29
Panicum capillare	10.00	100.00	19.61	10.00	19.61	10
TOTAL INTRO. ANN. GRASSES	39.0	100.0	76.5	39.0	76.5	39
INTRODUCED PERENNIAL FORBS						
Convolvulus arvensis	0.00	100.00	0.00	0.00	0.00	P
TOTAL INTRO. PERENNIAL FORBS	0.0	100.0	0.0	0.0	0.0	P
NATIVE PERENNIAL GRASSES (cool)						
Pascopyrum smithii	2.00	100.00	3.92	2.00	3.92	2
TOTAL NATIVE PERENNIAL GRASSES (c)	2.0	100.0	3.9	2.0	3.9	2
INTRODUCED PERENNIAL GRASSES (cool)						
Thinopyrum intermedium	9.00	100.00	17.65	9.00	17.65	9
TOTAL INTRO. PERENNIAL GRASSES (c)	9.0	100.0	17.6	9.0	17.6	9
Standing dead	7.00	100.00		7.00		7
Litter	37.00	100.00		37.00		37
Bare soil	5.00	100.00		5.00		5
TOTALS	100.0			100.0		100
TOTAL VEGETATION COVER	51.0 (s=0.0)		100.0	51.0 (s=0.0)	100.0	51
GROUND COVER (Litter+Rock+Veg+St.Dead)	95.0			95.0		95
SPECIES DENSITY (# of species/100 sq.m.) (AVERAGE= 7.0 Std.Dev.= 0.0)						7

P=Present within 1 m. on either side of the cover transect but not quantitatively encountered.



Photograph 1. City of Louisville Prairie Dog transect 1 - 2008

Photograph 2. City of Louisville Prairie Dog transect 2 - 2008



Photograph 3. City of Louisville Prairie Dog transect 3 - 2008

Photograph 4. City of Louisville Prairie Dog transect 4 – 2008

Photograph 5. City of Louisville Prairie Dog transect 5 – 2008